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**U. S. ARMY MATERIEL COMMAND**

EXPLOITATION REPORT

BULGARIAN PROTECTIVE MASK

MCN-18977

Prepared by U. S. Army Chemical Center, Maryland

**U S ARMY  
FOREIGN SCIENCE  
AND  
TECHNOLOGY  
CENTER**



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**LETTER REPORT  
ON  
BULGARIAN PROTECTIVE MASK  
(MCN 18977)**

**31 October 1961**

**U. S. ARMY  
CHEMICAL CORPS INTELLIGENCE AGENCY  
FIELD OFFICE  
ARMY CHEMICAL CENTER, MARYLAND**

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## ABSTRACT

The Bulgarian Protective Mask (MCN 18977) appears to be a mine rescue type apparatus. The DOP penetration was 50.0% and the air resistance across the canister was 87 mm of water. The overall outlet valve leakage is 0.008%. Canister Resistance to chemical agents was 0.2 minutes for a concentration of 4.0 mg CK/liter and 0.3 minutes for a concentration of 50.0 mg PS/liter.

The charcoal was not analyzed because of the very short CK life. Biological agents tests were not performed. The degree of protection afforded by this mask is very limited.

Due to the short CK and PS life and high DOP penetration, the Bulgarian Protective Mask has very little military significance.

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## I. INTRODUCTION

### A. Object

To present the results of an exploitation of one Bulgarian Protective Mask (MCN 13977). Biological agent evaluation was not performed.

### B. Background

The mask is reportedly an anti-atomic defense mask which was stored in DIMITROVO, BULGARIA. The item is intended for civil use only. No production estimates or stockpiling information is available.

## II. DESCRIPTION

### A. Details of Construction

The protective mask consist of three major groupings: mouthpiece and hose, canister, and eyegoggles (see figure 1).

#### 1. Mouthpiece and Hose

The mouthpiece assembly consists of a gray rubber mouth guard, a gray flat metal tube with a high-hat type outlet valve attached (see figure 5). A circular metal cover protects the outlet valve. The base of the metal tube has a metal flange and rectangular rubber washer to facilitate carrying the mouth piece assembly. Two extended rubber stubs on the mouthpiece enable the wearer to secure the position of the mouthpiece in use. A gray accordion rubber hose is attached to the metal tube and the effluent opening of the canister. A spring wire nose clip with rubber tabs is used to restrict air flow through the nose.

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**CONFIDENTIAL****2. Canister**

The canister is enclosed in a sheet metal container with a semi-circular opening in the top. The outside container is ribbed for reinforcement and painted brown and gray. The bottom is crimped and soldered to the body. Two projections are attached at the top opening. Two D rings are attached to the container for a cloth carrying strap. The interior construction of the canister and the route of air through it is shown in figure 6.

**3. Eye Goggles**

The eye goggles are made of gray rubber with circular glass eye-lens recessed in the molded rubber. An adjustable elastic rubber webbing band is attached to the eyepiece for donning. Rubber projections on each end of the eyepiece secure the elastic band.

**B. Dimensional Data**

Table 1 presents the dimensional data for the Bulgarian Protective Mask.

Table 1. Dimensional Data

Component	Length		Width		Height		Weight	
	cm	in.	cm	in.	cm	in.	gm	oz.
Canister	14.0	5.5	9.7	3.8	10.2	4.0		
Hose	28.0	11.0	3.3 <sup>a</sup>	1.3 <sup>a</sup>	----	---	1018.6 <sup>b</sup>	35.9 <sup>b</sup>
Goggles	22.9	9.0	6.3	2.5	----	---	84.4	3.0
Eyelenses	----	----	4.6 <sup>a</sup>	1.8 <sup>a</sup>	----	---	-----	----
Cover	13.5	5.3	9.4	3.7	7.1	2.8	177.5	6.3

<sup>a</sup>diameter

<sup>b</sup>total weight of canister and hose

**C. Condition**



The Bulgarian Protective Mask was received in excellent condition.

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**CONFIDENTIAL****D. Markings**

The markings on the Bulgarian Protective Mask are presented in Table II.

Table II. Markings

Component	Marking	Location	Meaning
Canister	И	Black ink stamp on base of canister (see figure 7)	
	3	Black ink stamp on base of canister (see figure 7)	
	СП-55М ХІ-59-79 СЯСЛАННО В СССР	Black ink stamp on base of canister (see figure 7)	
	XL-59	Blue ink stamp on top of canister	
Mouth-piece	3	Blue ink stamp opposite side of outlet valve	
	1 39      Г 9	Blue ink stamp on hose under tape at canister end	
Goggles		Black ink stamp on outer right side (see figure 8)	
	101	Black ink stamp on outer left side (see figure 9)	
	05	Molded marking on inner left side (see figure 10)	
Outlet Valve	Я 281X59	Blue ink stamp on top (see figure 11)	
	 36	Molded marking on valve base (see figure 12)	

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## 111. EXPERIMENTAL DATA

a. DOP Penetration and Air Resistance/ The DOP penetration of 0.3 micron particles at a flow rate of 32 liters/minute was 50.0% and the air resistance (pressure drop) across the canister at a flow rate of 85 liters/minute was 87 mm of water.

The water sorption of the canister after 80% R.H. humidification was 41.0 grams.

b. Outlet Valve Leakage. The results of dry-valve, ammonia vapor, breather pump test on the outlet valve of the Bulgarian mask is presented in Table III.

Table III. Outlet Valve Leakage Dynamic Test (Percent)

Run Nr.	Breather Pump Rates (l/min)		
	10.3 (Sedentary)	29.9 (Sim. Walking 5 MPH)	54.7 (Sim. Max. Exertion)
1	0.008	0.004	0.013
2	0.004	0.005	0.009
3	0.009	0.003	0.017
Average	0.007	0.004	0.013
Overall Average			0.008

c. Canister Resistance to Chemical Agents. The results of canister resistance to CK (cyanogen chloride)<sup>1</sup> at an intermittent flow rate of 50 liters/minute and PS (chloropicrin)<sup>2</sup> at a constant flow rate of 32 liters/minute are presented in Table IV. The canister was humidified at 80% relative humidity and the gas-air stream was 50% relative humidity.

<sup>1</sup>CK, although no longer a standard chemical agent, has the ability to rapidly penetrate a canister which contains unimpregnated charcoal. CK requires catalytic decomposition to render it harmless, and only a good impregnated charcoal will do this effectively. Thus, CK life gives an approximation of the degree of impregnation present on a charcoal. Although at present, the possibility of CK being used as a canister penetrant in future chemical warfare seems remote, it is quite possible that other agents which would require catalytic decomposition may be developed at a later date. For these reasons, canisters are tested for resistance to CK.

<sup>2</sup>PS is used in these tests because it is adsorbed on the charcoal in exactly the same way as GB and VX. Because of its relative safety and ease of handling compared to the nerve agents, PS is well suited to the evaluation of canisters in the laboratory.

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**CONFIDENTIAL****Table IV. Canister Resistance to Chemical Agents**

Agent	Agent Concentration mg/liter	Time to Chemical Breakpoint (minutes)
CK	4.0	0.2
PS	50.0	0.3

**IV. COMPARISON WITH U.S. COUNTERPART**

The results of a comparison of the Bulgarian Protective Mask with the U.S. M9A1 protective mask and M11 canister are presented in Table V.

**Table V. Comparison with U.S. Counterpart**

Test Conducted	Bulgarian Protective Mask	U.S. M9A1 Protective Mask with M11 Canister
DOP Penetration (%)	50.0	0.0024
Air Resistance (mm water)	87	65
Percent Outlet Valve Leakage of Chemical Agents Breather Pump Rates (liters/minute) 10.3 29.9 54.7	0.007 0.004 0.013	0.009 0.006 0.000 <sup>a</sup>
Canister Resistance to Chemical Agents Agent CK 4.00 mg/l Agent PS 50.0 mg/l	0.2 min 0.3 min	36.2 min 28.3 min

<sup>A</sup>Based on tests of three M9A1 Masks, there was no measurable leakage. This should not be interpreted as no leakage, but rather as no leakage within test parameters.

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**CONCLUSIONS**

The Bulgarian Protective Mask has a very short CK (0.2 minutes) and PS (0.3 minutes) lives. The DOP Penetration is very high (50.0%). For these reasons, the chemical agent protection afforded by the Bulgarian Protective Mask is poor. Biological agent protection would also be limited by this type of mask.

The Bulgarian Protective Mask has very little military value.

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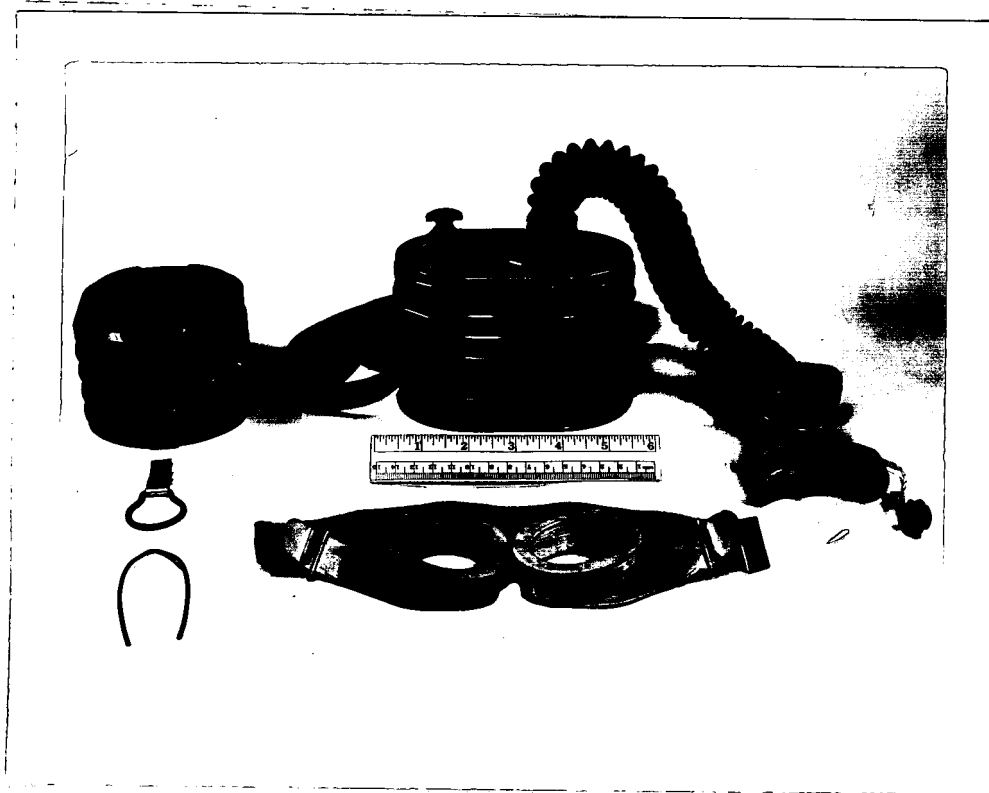
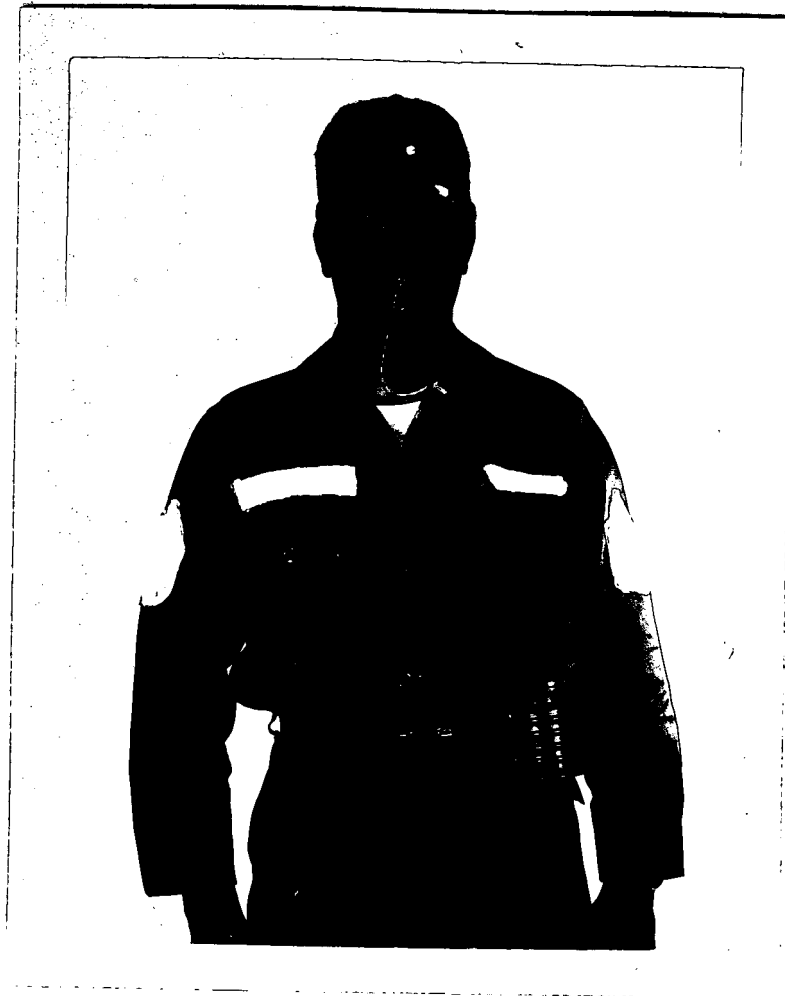


Figure 1  
Overall View of Bulgarian Protective  
Mask, eye goggles, and Cover

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**Figure 2**  
**Front View of Person Wearing**  
**Bulgarian Protective Mask**

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Figure 3  
Side View of Person Wearing  
Bulgarian Protective Suit

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Figure 4

View of Carrying Position of the  
Bulgarian Protective Mask

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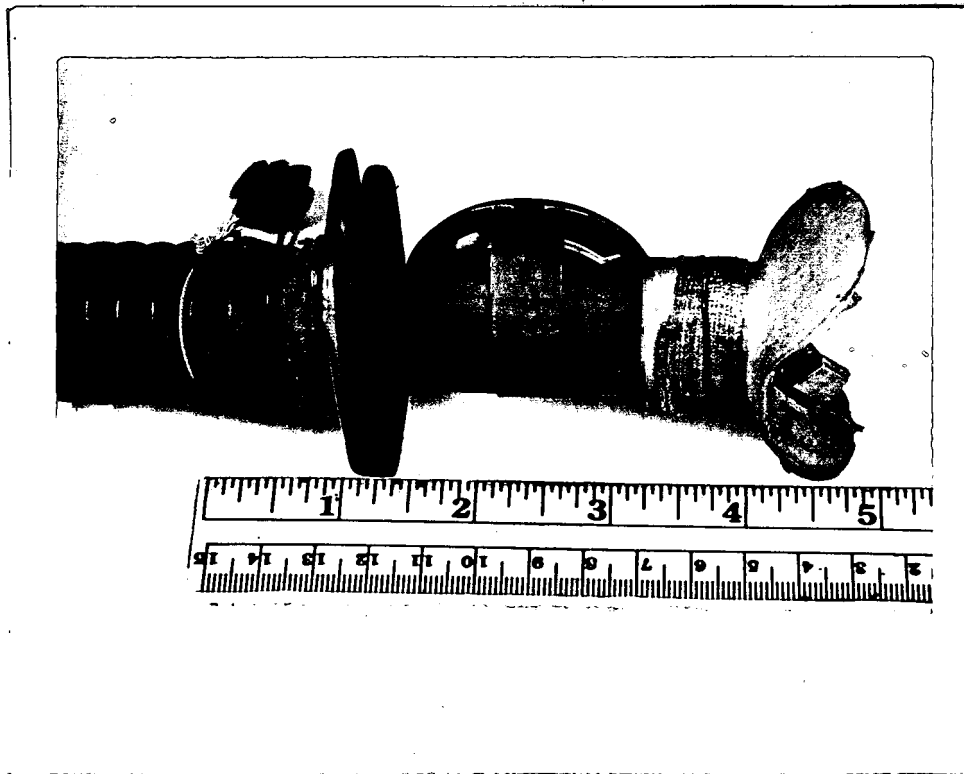


Figure 3

View of Mouthpiece and Outlet Valve

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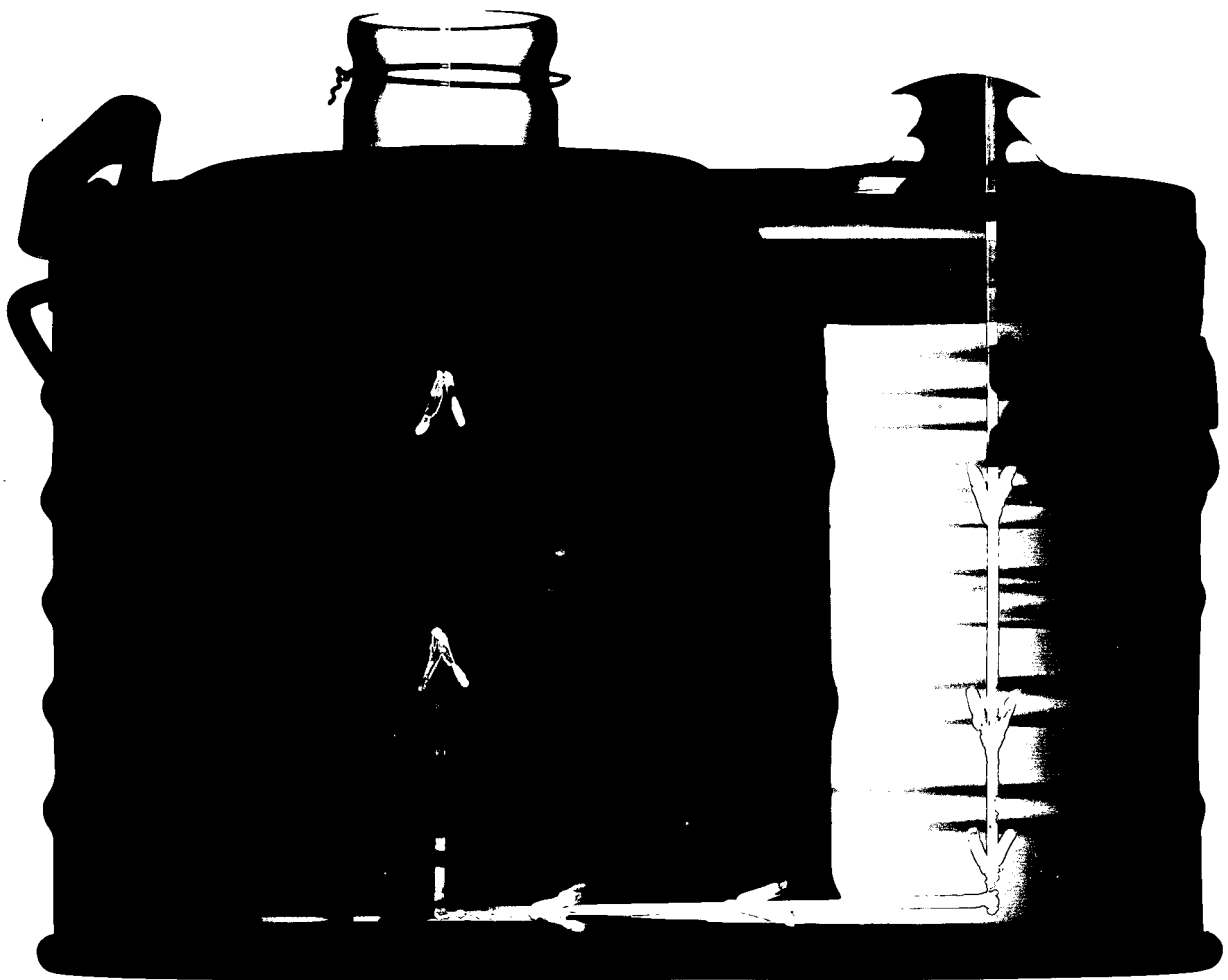


Figure 6  
X-ray View of Canister and Air Flow Path

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Figure 7

Markings on Base of Canister

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Figure 3

Marking on Right Side of Eye Goggles

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Figure 3

Marking on Left Side of Eye Goggles

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Figure 10

Bolts Marking on Inner Left Side

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Figure 11

Marking on Top of Outlet Valve

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Figure 12

Marking on Base of Outlet Valve

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